# Luke Egress Airmen Reduce F-35 Canopy Shaped Charge Replacement Time by 120 Hours

*By Senior Airman Ridge Shan, 56th Fighter Wing Public Affairs*

**LUKE AIR FORCE BASE, Ariz.** -- Over the past two months, Airmen from the 56th Component Maintenance Squadron's Egress Systems Flight developed a new process for the replacement of flexible linear shaped charges on F-35 Lightning II canopies.

In an emergency situation when an F-35 pilot is required to eject, the FLSC is the component responsible for destroying and separating the canopy from the rest of the jet, giving the pilot's seat a clear path to depart the aircraft.

To ensure the charges function correctly and safely, they are regularly replaced. Before February, the process to replace the charges took several teams of maintainers more than a week.

"The explosives we maintain have expiration dates and life limits, may receive damage over time, and may face other issues," said Staff Sgt. Ryan Bessery, 56th CMS egress technician. "When we first started replacing them, it was a very long process. Our first one took ten days. We knew we needed to speed it up."

The 56th CMS began their effort to reduce the FLSC replacement time by assessing shortcomings and identifying possible improvements

The initial replacement process contained numerous steps which had to be completed sequentially. Several steps contained wait times lasting between 24 and 36 hours.

“There was a lot we had to do, and with the amount of time each task took, we had different sections waiting for us to hand it off so that they could do their part of the process,” Bessery said. “We knew there were a lot of things we could consolidate.”

In total, the entire FLSC replacement process took approximately 178 hours. Since February, the 56th CMS’s egress technicians reduced that time to 58 hours, and will reduce it even further in the coming weeks.

“Our goal is a 24-hour turnaround,” said Staff Sgt. Tyler Volk, 56th CMS egress technician. “One shift removes the canopy and strips it, one shift lays the charge, and one shift rebuilds the canopy and puts it back on the jet. This should allow us to have the aircraft down for one day, instead of one week.”

Before any changes were made, the 56th CMS knew the best place to determine if there were more efficient ways to perform the process was from the source of the canopies and producer of the F-35: Lockheed Martin.

“We use a template to perform the measurements necessary to conduct an FLSC replacement,” Volk said. “We were previously relying on Lockheed to supply that template.”

According to Volk, with the help of some Lockheed specifications and on-base manufacturing resources, the 56th CMS was able to produce their own multi-piece template which was both cheaper and easier to use.

“We spoke to a Lockheed expert who was able to procure drawings for us,” Bessery said. “We made our own template to specifications, and were able to divide it into smaller pieces, which saved us time.”

The egress section further identified that the time spent pre-shaping charges could be dramatically reduced and eventually eliminated entirely.

“A pre-shape involves laying the flexible charge out in the canopy, letting it sit for a day to mold, and then adhering it,” Bessery said. “When we tried a replacement without it, everything went well, and we cut out 24 hours from the process with the removal of a single step.”

The egress section also discovered there were steps along the process that could be completed concurrently, instead of in sequence, without interfering with one another.

“With the pre-shape out, we could now lay and adhere the flexible charge at the same time,” Bessery said. “We could do the fillet seal immediately, and on the same day do retainers, manifolds, and windows.”

Finally the egress section improved training processes to maximize the number of Airmen who could complete the replacement.

“We suddenly started getting a lot of them [replacements] in and we didn’t have enough people,” Bessery said. “Now we have enough people to do three shifts through three days and have everything installed back on the aircraft by the end of the third day.”

Through a combination of research, redeveloped training processes, in-house manufacturing, and work integration, the egress section estimates the total FLSC replacement time will be reduced to 51 hours by May, eliminating 127 hours per replacement from the initial process.

The 56th CMS is already preparing to share their knowledge with other F-35 bases around the country.

“We’ve built six new templates to send to all of the F-35 bases,” Volk said.

They also recently sent an Airman to Hill Air Force Base, Utah to advise on their process with the hope of sending more in the future.

As the F-35 program continues to expand, Volk and Bessery are confident the new process will redefine, improve, and set the standard for FLSC maintenance procedures, changing the Air Force from right here at the 56th Fighter Wing.